

*Science and Technology*

Subject: ADSL NMS R1 Deployment Architecture  
and Sizing Analysis - Issue 2

Date:

Author: Ward Chewning  
41V90 BSC  
(404) 332-2137

*Memorandum for File*

**1.0 Introduction**

The ADSL Network Management System (NMS) provides customer and network management to support Fast Packet ADSL service. The service is currently targeted for mass market deployment in and is based on underlying Alcatel ADSL and Ascend ATM technologies. The ADSL NMS provides major functionality in the following areas:

- network creation
- flow-through provisioning from SOCS to establish end-to-end PVC connectivity
- PVC management across the ADSL and ATM sub-nets
- alarm management and fault correlation
- forwarding of alarms to NMA
- trouble isolation
- capacity management

The ADSL NMS application is built using OSI's NetExpert platform which runs on a Sun/UNIX/Oracle hardware/software base. The main system will be located in the DCSC with remote sub-net servers in the Birmingham and Charlotte data centers. The purpose of this document is to provide a basis for the sizing analysis that was done, describe the deployment architecture, and quantify the costs associated with the deployment system.

**2.0 Document Organization**

Section 1 is an introduction.

Section 2 describes how the document is organized.

Section 3 gives assumptions used in the sizing analysis.

Section 4 depicts the deployment architecture.

Section 5 defines the hardware and software configuration.

Section 6 provides a costing analysis.

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### **3.0 Sizing Assumptions**

A sizing analysis was performed by S&T and OSI in [redacted] based on the object model designed at that point in time. Assumptions were made about projected growth, number of users, and alert activity based on the latest business and technology model. These assumptions may not reflect the current thinking in these areas but provide a reasonably good baseline to do initial system sizing. The following assumptions were used in the analysis:

1. Number of customers
  - 5000 customers total
  - 55,000 customers total
  - 105,000 customers total
2. Percentage of customers connected to service gateway - 75%
3. Customers added/deleted per day
  - 30 avg / 100 peak
  - 300 avg / 600 peak
  - 300 avg / 600 peak
4. Average number of VCCs per customer
  - 1
  - 1.2
  - 1.4
5. Number of simultaneous operators (70% actively updating screens at any point in time)
  - 40
  - 70
  - 100
6. ADSL Equipment Alerts - 10%-20% of active VCCs (should decrease over time).
7. ATM Equipment Alerts - 1% of active VCCs (only receiving OC3 alarms, should be low)
8. Maximum ADSL equipment alarms when in "panic mode" - 12/sec
9. Maximum ATM equipment alarms when in "panic mode" - 100/sec
10. Inter-connectivity bandwidth - 10M/sec
11. Deployment hardware - Sun
12. Processors used solely for NMS
  - 1 for Netexpert Ideas Server/Oracle
  - 1 for Interface Gateway (SOCS/NMA)
  - 1 for ATM Sub-Net Server
  - 2 for ADSL Sub-Net Servers (remotely located in Data Centers)

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## 4.0 Deployment Architecture

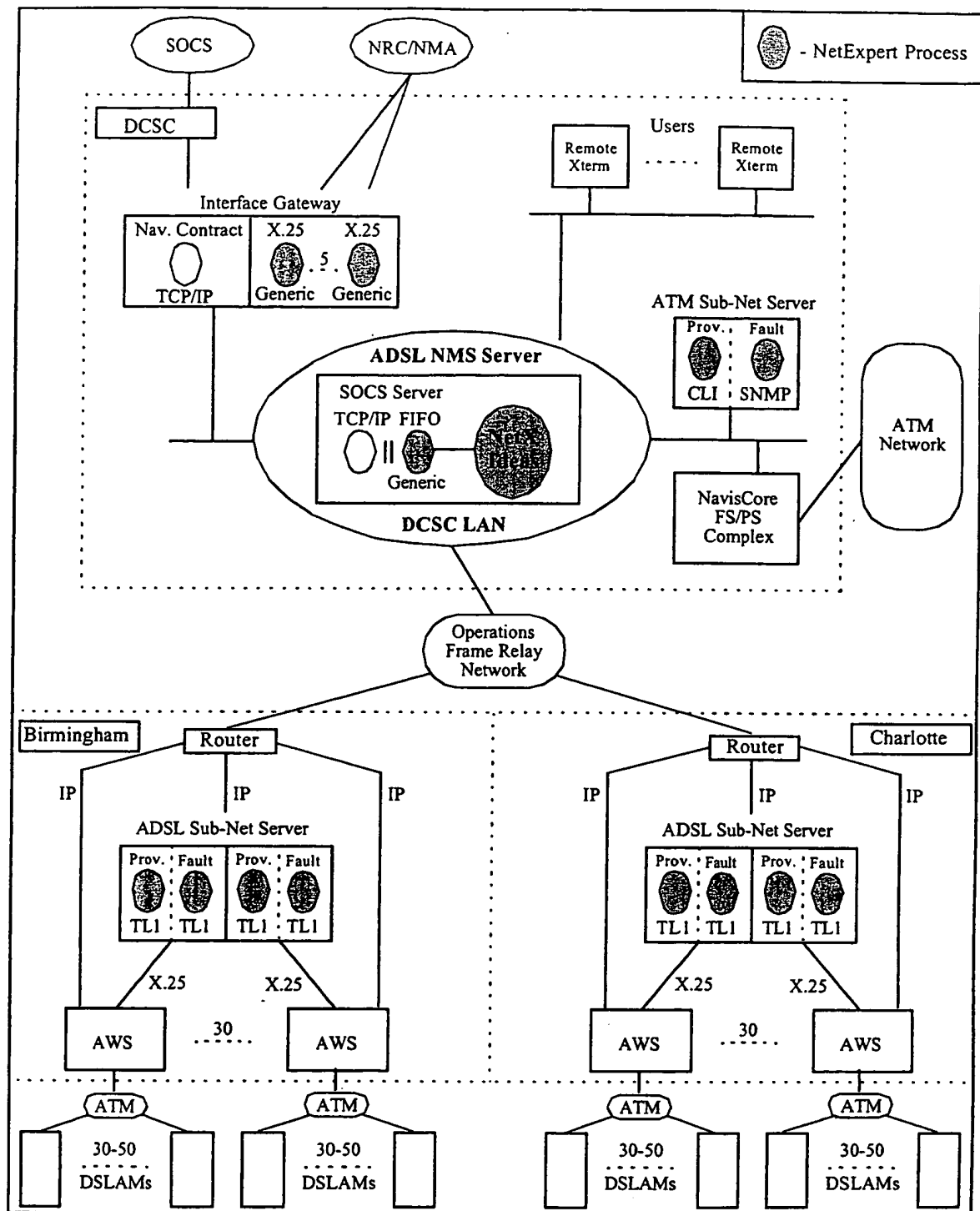


Figure 1 - ADSL NMS Initial Deployment Architecture

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## 5.0 Hardware/Software Configurations

### 5.1 ADSL NMS Server

#### Hardware

Sun Enterprise 4000  
4 250 Mhz CPUs with 4 M cache  
2 GB memory  
25 GB disk

#### Software

##### Sun

Solaris Server - Version 2.6

##### Oracle

Oracle - Version 7.3.2

##### OSI

NetExpert Ideas Processor and VA Server - Version 3.5  
1 Generic Gateway  
10 Xterm Operator Workstations with SL/GMS capability  
1 Set of Rule Editors  
Package Administration Tools

### 5.2 ADSL Sub-Net Servers

#### Hardware

Sun Enterprise 450  
2 300 Mhz CPUs with 2 M cache  
1 GB memory  
16 GB disk  
1 HSI adapter

#### Software

##### Sun

Solaris Server - Version 2.6  
SunLink X.25 Server - Version 9.1

##### OSI

X.25 Protocol Agent  
Per AWS Licenses  
2 Generic Gateways

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### **5.3 ATM Sub-Net Server**

#### **Hardware**

Sun Enterprise 450  
1 300 Mhz CPU with 2 M cache  
1 GB memory  
16 GB disk

#### **Software**

##### **Sun**

Solaris Server - Version 6.2

##### **OSI**

1 Shell Protocol Agent  
1 Generic Gateway  
1 SNMP Gateway

### **5.4 Interface Gateway**

#### **Hardware**

Sun Enterprise 450  
1 300 Mhz CPU with 2 M cache  
1 GB memory  
16 GB disk  
2 HSI adapters

#### **Software**

##### **Sun**

Solaris Server - Version 6.2  
SunLink X.25 Server - Version 9.1

##### **OSI**

X.25 Protocol Agent  
1 Generic Gateway

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## **6.0 Costing Analysis**

### **6.1 Considerations/Variability**

#### **ADSL NMS Server**

- initial system configured for up to 105,000 customers

#### **DCSC End-Users**

- initial system configured for up to 10 simultaneous operators in
- each additional operator requires \$10,000 in OSI licenses

#### **ADSL Sub-Net**

- one server per data-center site
- up to 30 AWSs per server can be supported (initial deployment with two servers can handle up to 60 AWSs - 500,000 customers)
- initially hardware provisioned for 8 AWSs per server
- initially software licensed for 1 AWS per server
- incrementally adding AWS connections (7680 customers) costs \$5,780
  - \$1,436 in X.25 serial port costs for 8 AWS connections
  - \$5,600 in OSI licenses for each AWS connection

### **6.2 Hardware**

ADSL NMS Server - 1 x 158,000	\$158,000
- 7X24 Maintenance/Support = \$7,500/year	
ADSL Sub-Net Servers - 2 x 45,500	\$91,000
- 7X24 Maintenance/Support = 2 x \$2,300/year = \$4,600 total/year	
ATM Sub-Net Server - 1 x 36,300	\$36,300
- 7X24 Maintenance/Support = \$2,300/year	
Interface Gateway - 1 x 40,000	\$40,000
- 7X24 Maintenance/Support = \$2,300/year	

**Hardware Total (Capital) = \$325,300**

**Hardware Total (Ongoing Maintenance) = \$16,700/year**

### **6.3 Software**

#### **Sun**

Solaris Server - \$200 (media costs)	\$200
- Software maintenance/upgrades - \$500/machine/year = \$2,500/year	

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SunLink X.25 Server - 3 x 3,000 \$9,000

Oracle

Oracle 7 - 4 licenses (1 per cpu) and SQL Plus \$4,000  
- Software maintenance/upgrades - \$1000/year

OSI\*

NetExpert Ideas Processor and VA Server - 1 x 110,000 \$110,000\*\*  
10 Xterm Operator Workstations with SL/GMS capability - 10 x 10,000 \$100,000  
Set of Rule Editors - 1 x 50,000 \$50,000  
Package Administration Tools - 1 x 30,000 \$30,000  
Shell Protocol Agent - 1 x 15,000 \$15,000  
X.25 Protocol Agent - 3 x 25,000 \$75,000  
SNMP Gateway - 1 x 4,000 \$4,000  
Generic Gateway - 11 x 3,500 \$38,500  
- Software maintenance/upgrades - 20% of total/year = \$84,500

**Software Total = \$435,700**

**Software Total (Ongoing Maintenance) = \$88,000/year**

\*OSI costs include the standard discount and 1st year required maintenance fees.

\*\*Budgeted cost should not include this amount due to credit from Video Scheduler agreement (budgeted Software Total = \$325,700)

**6.4 Deployment Costs**

**Initial Deployment Costs:**

Capital

Hardware Total = 325,300

Expense

1st Year Hardware Maintenance = \$16,700  
Software Total = \$435,700 (includes 1st year OSI maintenance fees)  
1st Year Additional Software Maintenance = \$3,500

**Total Deployment Costs = \$781,200**

**Additional Deployment Costs:**

In order to scale up to 105,000 customers, an additional 50 DCSC operators (\$10,000 OSI licenses/operator) must be added = \$500,000. Ongoing maintenance - 20% of total/year = \$100,000

Expense

Software Total = \$500,000 (includes 1st year OSI maintenance fees)

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Total Deployment Costs = \$500,000

#### Cost Per User

Total cost for system supporting 105,000 customers and 60 DCSC operators (through ) is \$1,281,200 (13 AWS connections). There is substantial infrastructure built into the costs associated with all the hardware servers that can be leveraged as the systems are upgraded to support over 105,000 customers. That savings has not been quantified for the long term.

The overall hardware and software cost per customer for the first 105,000 customers is \$12.20 for the initial installation of the ADSL NMS not including installation, operations, or development costs.

#### 6.5 Ongoing Maintenance Costs

Total ongoing costs per year = \$204,700 (includes software maintenance and hardware service contracts)

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